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Financial Markets and Industrial Development: A Comparative Study of Government Regulation Financial Innovation, and Industrial Structure in Brazil and Mexico, 1840-1930

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IRIS Summary **Working Paper #143**

Financial Markets and Industrial Development: A Comparative Study of Government Regulation, Financial Innovation and Industrial Structure in Brazil and Mexico 1840-1930.

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This paper examines the experiences of Mexico and Brazil in the creation of modern banks and stock exchanges during the early stages of industrialization. It addresses three interrelated questions. First, what were the differences in the development of financial intermediaries in both countries. Second, what were the consequences for the structure and rate of growth of industry of these differences in institutional development? Third, what were the sources of these differences in institutional development? Why did Brazil develop a modern stock and bond market during the 1890s and Mexico did not?

In order to answer these questions, the paper focuses on the history of textile mill finance in both countries. I focus on textiles because it was the largest industry in both countries under study and because textiles should be characterized by near perfect competition. Minimum efficient scales tend to be small the capital stock is easily divisible, and there are no legal or technological barriers to entry. In short, high levels of concentration in the textile industry can easily be tied to imperfections in capital markets.

The results indicate that government regulatory policies play a profound role in the size and structure of financial markets. Mexico's regulatory policies were such that they constrained the development of the banking system. In fact, the Mexican government created policies designed to create barriers to entry into the banking industry in order to favor a single, semiofficial super-bank that would serve as a source of finance for the State. These policies included high reserve ratios for competing banks, high minimum capital requirements for competing banks, limits on the acceptability of competing bank's notes, taxes on bank notes issued by other banks, and special permits requiring approval of congress and the Secretary of the Treasury to enter the banking industry. The result was that the banking industry remained small and concentrated. Because the banking system was constrained in its development. the securities markets were as well. The result was a financial system which provided industrial capital only to those entrepreneurs lucky enough to be tied to the banking system. That is, unlike Brazil, which adopted more liberal bank and stock market regulatory schemes in the 1890's, in Mexico there was differential access to capital. Some entrepreneurs had all the capital they wanted while every one else was starved for funds.

Differential access to capital, in turn, served as a barrier to entry in the cotton textile industry. In fact, the data unequivocally indicate that the limited opening of Mexico's capital markets in the 1890s actually gave rise to an increase in industrial concentration. The four textile firms with access to the banking system and the stock market came to control nearly 40% of the domestic market for cloth.

The implications of the work are the following. First, in LDCs, the development of financial intermediaries is not endogenous to the process of economic growth. In LDCs the high costs of coordination and cooperation means that the private sector cannot easily mitigate the effects of government policies designed to constrain its behavior. Thus, in LDCs capital market regulatory policies may exert powerful and unintended effects on economic efficiency. In the cases discussed here, government regulatory policies gave rise to imperfections in the Mexican capital market.

Second, imperfections in capital markets may give rise to imperfections in product markets. One of the sources of highly concentrated industrial sectors in LDCs is a barrier to entry created by differential access to capital.

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Historians of the United States and Western Europe have long been interested in how capital was mobilized for industrial development during the nineteenth century. One result of this interest is a mature literature addressing the impact of government regulatory regimes on the development of financial markets, the transformation of kinship-based financial networks into modern financial institutions, and the relationship between the structure and size of capital markets and the structure and size of industry, among other issues.[1] Three themes emerge from this literature. First, government regulatory policies played a critical role in structuring capital markets. Second, the develapment of impersonal sources of capital (banks, stock *exchanges,* bond markets) were crucial for industrial success in the nineteenth century. Third, imperfections in capital markets strongly influenced the geographic location and productive organization of industry.[2] In short, the literature on advanced industrial economies suggests that the growth of institutional sources of capital was not itself a necessary outcome of the larger process of economic growth: regulatory policies and the legal tradition had important independent effects which were felt in both the financial and industrial sectors.

Comparatively speaking, Latin American historians have done very little work on any of these issues, except for a few recent studies on the history of banking in Brazil, Mexico, and Peru and a single study of the Rio de Janeiro stock market. Moreover, most of what has been done is of an institutionalist

nature.[3] Not surprisingly, none of it directly addresses the question of how the growth of capital markets affected the region's industrial development.*

This article therefore employs the tools and techniques of economic analysis to study one of nineteenth century Latin America's most salient obstacles to economic growth and structural transformation: the absence of well-developed capital markets. It addresses two inter-related questions. First, what impact did government regulatory policies have on the development of financial markets in Brazil and Mexico? Second, what was the relationship between the development of capital markets and the development of industry? That. is, how well do the different experiences of Brazil and Mexico in the development of institutional sources of finance account for differences in the two country's rate of growth and structure of the cotton textile industry?

I focus on Brazil and Mexico because they were the two most industrialized economies of Latin America during the period under study.[5] Moreover, focusing on Brazil and Mexico allows for the testing of hypotheses about the impact of institutional innovations in finance on the growth and structure of industry. Rnth countries followed repressive financial market regulatory policies throughout the nineteenth century, and both, therefore, had small capital markets which provided little in the way of industrial finance. In 1889, however, Brazil created a less repressive regulatory environment, opening up new sources of finance for its textile industry. Moreover, the costs of

obtaining information were lowered in Brazil because its financial market regulations required all publicly held joint stock companies to publish balance sheets and lists of shareholders twice each year. Since Mexico did not undertake these kinds of regulatory reforms, the Brazil-Mexico comparison provides a counter factual test case for understanding the effects of these regulatory changes on Brazil's industrial development and allows us to measure the loss to Mexico when it failed to enact similar, less repressive policies and failed to lower the costs of obtaining information.

I focus on the cotton textile industry for two reasons. First, the cotton goods manufacture was the most important manufacturing industry in Mexico and Brazil during the period under study.[6] Second, there are compelling theoretical reasons to focus on cotton textiles. In underdeveloped economies, numerous factors, such as large economies of scale or technological barriers to entry, can condition the development of many industries. Separating out the effects of access to institutional sources of capital (that is, from impersonal institutions such as banks, bond markets, and stock exchanges) from among these other factors is difficult across the entire industrial sector. In the cotton textile industry, however, these other factors did not come into play: the capital equipment was easily divisible, the minimum efficient scale of production was small, and non-financial barriers to entry were largely absent. The only important barrier to entry was access to finance.[7] The textile industry therefore provides an

excellent test case of the relationship between the development of the financial markets that provide capital to an industry and the development of the industry itself.[8]

The argument advanced runs in the following terms, The size and structure of financial markets played a crucial role in determining the size and structure of the textile industry. In Mexico, where the banking system was small and concentrated, the distribution of bank loans among potential textile industrialists was narrow; banks could only monitor a limited number of borrowers. Differential access to bank capital, in turn, gave rise to differential access to equity capital: entrepreneurs with the proven ability to obtain loans for working capital had a significant advantage over their competitors when it came to selling equity in the securities markets. In short, a small group of powerful financiers was able to obtain all the capital they needed, while everyone else was starved for funds.

The results were two-fold. First, the textile industry was highly concentrated, because access to impersonal sources of capital served as a barrier to entry. Second, since the ability to mobilize capital from banks and the securities markets was a scarce talent, financial capitalists played an important role in the development of the cotton textile industry.

In Brazil, where the institutional rules of the game after 1889 created larger and less concentrated capital markets, the distribution of funds among potential textile industrialists was broader. Access to institutional sources of finance did not,

therefore, serve as a barrier to entry, which in turn meant tht the textile industry in Brazil tended to be relatively less concentrated. In fact, as the capital markets broadened in Brazil during the last decade of the nineteenth century and the first decade of the twentieth, industry tended to become increasingly less concentrated over time. This is precisely the opposite outcome that obtained Mexico. In the Mexican case, differential access to capital created by the limited opening of the capital markets during the 1880's and 1890's actually gave rise to an increase in concentration.

The reason for these differences between Mexico and Brazil was largely political. The abolition of slavery in 1888, overthrow of the Brazilian monarchy in 1889, and the formation of the First Republic brought about a liberalization of the policies regulating financial markets, which spurred the growth of the banking sector, the stock exchange, and the bond market. Mexico did not undergo such a transformation: it continued to be ruled by the Porfirio Diaz dictatorship (1876-1911), which relied on the financial and political support of a small group of politically powerful financial capitalists. This financial elite used its political power to erect legal barriers to entry in the bankinq industry. In return, their banks dedicated a significant part of their portfolio's to government loans, providing a stable and secure source of state finance. Moreover, the politicized nature of doing business in Mexico and the difficulty in obtaining information on the financial state of firms meant that only the enterprises of well known financial

capitalists had much hope of attracting outside investors. The corporate form of ownership therefore spread much more slowly than in Brazil.

The first section of this paper compares the institutional history of financial intermediaries and textile mill financing in the two countries over the period from 1840 to 1930. The second section then examines the rate of industrial investment in the two countries and measures the level of industrial concentration in each country over time through the estimation of four-firm ratios and Herfindahl indices, assessing changes in the size and structure of the textile industry in the light of institutional innovations in textile finance. It also develops a counter-factual model to estimate the loss to Mexico of its repressive financial market regulatory policies. The third section concludes.

I. Capital Markets and Textile Finance

There are five ways that entrepreneurs can mobilize capital for industrial investment. The first and most common form of capital mobilization is for an entrepreneur to borrow money from his network of kin relations and business associates. The disadvantage of this approach is that, should the enterprise fail, the entrepreneur is liable for the firm's debts. In addition, this method has the drawback that the amount of capital that can be raised is limited by the wealth and willingness to invest of an entrepreneur's social network. This severely limits the scale of investment that may be undertaken.

In order to partially overcome these disadvantages, an

entrepreneur can use his social network to raise capital through a second avenue: **provide his** kin **and** business associates **with an** equity stake in the firm by forming a partnership or *privately*-held joint stock company. This spreads risk among all of the principals, but the amount of capital that may be mobilized is still limited **by the wealth and willingness of the entrepreneur's family and business network.**

Third, an entrepreneur can reinvest the profits of an **already extent enterprise. The disadvantage of this method is that** it is slow: new investment is limited by the amount of profits in a previous period. In addition, it presumes that the original investment capital can be generated through some other means, such as the two methods discussed above.

Fourth, entrepreneurs can borrow money from an institutional source, such as a bank, or from a group of investors that they do not personally know through the sale of bonds. This avenue can only be used, however, if banks and bond markets exist and if bankers and bond holders are willing to lend money to businesses in which they have no direct knowledge or control. An added disadvantage of this approach is that a sole proprietor or partnership will still be legally responsible for the debts to these institutional investors if the business fails.

A fifth method of capital mobilization solves **this** liability problem. An entrepreneur can sell equity in an enterprise to impersonal investors by forming a publicly traded, limited liability, joint stock company. This method can

mobilize large amounts of capital quickly and spreads risk among a large group of investors. Moreover, stockholders in a limited liability company are not personally responsible for the debts of that company should it fail. This approach to capital mobilization can only be employed, however, if there is a stock market on which to sell shares and if investors perceive that owning shares in a business that they know relatively little about is a secure way to invest their savings. Like the sale of debt to impersonal investors, this avenue of finance requires the existence of institutions that bring together those with capital with those who need it. It also requires that mechanisms exist to provide useful and reliable information about the financial health of firms to potential investors. In short, in order to mobilize capital through impersonal sources, specialized institutions must be developed (stock exchanges, bond markets, banks) whose purpose is to connect savers and investors, overcome information asymmetries, and reduce transaction costs.

Until the last decade of the nineteenth century, Brazilian textile entrepreneurs were limited to the first three methods of capital mobilization. Brazilian firms could neither sell equity on the stock exchange nor appeal to the banking system for loans; industrialists therefore had to rely on their extended kinship groups and reinvested profits in their search for finance. Beginning in the 1890's, however, Brazil's capital markets, prompted by government regulatory reforms, underwent a long process of expansion and maturation. The result was that

impersonal sources of finance became widely available to Brazilian textile manufacturers.

Throughout most of the nineteenth century, institutions designed to mobilize impersonal sources of capital were largely absent in Brazil. An organized stock exchange had functioned in Rio de Janeiro since early in the century, but it was seldom used to finance industrial companies. During the period from 1850 to 1885 only one manufacturing company was listed on the exchange, and its shares traded hands in only 3 of those 36 years. Neither could Brazil's mill owners appeal to the banking system to provide them with capital. In fact, formal banks were so scarce as to be virtually nonexistent. As late as 1888 Brazil had but 26 banks, whose combined capital totaled only 145,000 contos--roughly $48 million U.S. Only 7 of the country's 20 states had any banks at all, and half of all deposits were held by a few banks in Rio de Janeiro.[9]

The slow development of these institutions can be traced in large part public policies designed to restrict entry into banking. The imperial government, which held the right to charter banks, was primarily concerned with creating a small number of large super-banks that could serve as a source of government finance and that would prevent financial panics. The absence of banks not only restricted the amount of credit available to textile entrepreneurs, but it also meant that banks could not underwrite securities trading or finance securities speculation, the way they did in the United States and Western Europe.[10] Finally, restrictive policies discouraged the spread

of the corporate form of ownership: Founding a joint stock company required special government permission; investors were not allowed to purchase stocks on margin; and banks were restricted from investing in corporate securities.[11]

The last decade of the nineteenth century, however, witnessed a dramatic and sustained transformation of Brazil's capital markets. Driving this transformation were public policies deregulating the banking industry and securities marlccts. Thcsc policies had two goals: appease Brazil's slavc3 owning classes for the loss of their slaves in 1888 by increasing the supply of credit; speed Brazil's transition from an agrarian economy run with slave labor to a modern industrial and commercial economy. As of 1889, legal barriers to entry into banking were removed and banks could engage in whatever kind of financial transactions they wished. Other reforms eased the formation of limited-liability joint stock companies and encouraged securities trading by permitting purchases on margin. Finally, new industrial ventures were exempted from taxes and customs duties.

Also of importance were financial reporting requirements that made managers more accountable to stockholders. Brazil's publicly traded corporations were required to produce financial statements twice a year and reprint them in public documents (such as the Diario Official or the Jornal do Commercio). In addition, their biannual reports had to list the names of all stockholders and the numbers of shares they controlled. Investors could thus obtain reasonably good information on thc

health of firms and the identities of their major shareholders.[12]

The results of these reforms, which came to be known as the Encilhamento, were dramatic. The nation's newly formed banks, flush with investable funds and free to employ them without restrictions, plunged into the Rio de Janeiro stock exchange, purchasing large numbers of corporate securities. The Rio exchange, which had been a staid and sleepy affair throughout the nineteenth century, now saw wild securities trading as well as an expansion of the number of firms listed. In the first year of the Encilhamento alone, it saw almost as much trading as it had in the previous 60 years.[13]

The speculative bubble created by the Encilhamento had two important effects. Over the short term, it created large numbers of banks. In 1888 there were but 13 banks listed on the Rio exchange; by 1894 there were 39.[14] Though many of these enterprises failed during the collapse of the bubble and the recurrent financial crises over the following decade, in the short run they provided loans to Brazil's textile industry.

The second and more important effect of the Encilhamento was that it financed the creation of large numbers of joint stock manufacturing companies. In 1888 only 3 cotton textile enterprises were listed on the Rio stock exchange; by 1894 there were 18, which grew to 25 in 1904 and to 57 in 1915, when it began to level off. Thus, in 1915, 57 of Brazil's 180 cotton textile companies (32 percent) were publicly traded, joint stock limited-liability corporations.[15]

The Encilhamento did nut, however, have similar long-term effects on the growth of banking institutions. Once the speculative bubble burst, the government reverted to its old, restrictive banking policies of the past. In 1896, it once aqain restricted the right to issue currency to a single bank acting as the agent of the treasury. These more restrictive regulations, coupled with the already shaky financial situation of many of the country's banks (exacerbated by a significant amount of foreign exchange speculation) produced an almost complete collapse of the banking sector. In 1891 68 banks were operating in Brazil; by 1906 there were but 10, and their capital was only one-ninth that of the 1891 banks. The banking sector then began to expand again, led and controlled by a semiofficial super-bank, the third Banco do Brasil. Despite this growth, the banking system appears to have lent very little of its investable capital to industry.[16]

For this reason, Brazil's textile industrialists issued bonds to raise loan capital. This bond market, like the stock exchange, was located in Rio de Janeiro and primarily benefitted Rio and Distrito Federal firms.[17] As early as 1905, 31 of Brazil's 98 textile firms (32%) were raising capital through the sale of debt. By 1915, 50 of the country's 180 firms (28%) reported bond debt in their census returns. In fact, a comparison of the 1305 and 1315 censuses indicates that new debt issues accounted for 29 percent of all new investment in the textile industry as a whole during that ten year period. For Rio de Janeiro and Distrito Federal firms, which were able to

easily tap into the bond market, new debt issues accounted for a whopping 69 percent of all new investment from 1905 to 1915. Thus, from 1905 to 1915, the average debt-equity ratio grew from .16:1.00 to .27:1.00 for Brazilian cotton textile firms as a whole and from .14:1.00 to .43:1.00 for firms in the Federal District and Rio de Janeiro.[18] Even the large-scale U.S. manufacturers in the 1860s, similar to the Rio and Distrito Federal firms, did not borrow on the scale that Brazilian firms did: U.S. ratios of loan debt to equity were typically in the .20:1 range.[19]

The development of the bond market appears to have been cut short by the First World War. Between 1915 and 1927, new debt issues accounted for only seven percent of new capital spending by Brazil's cotton textile firms. Even the Rio de Janeiro and Distrito Federal firms felt the pinch: only nine percent of net new investment there was accounted for by new bond issues. Thus, by 1927 debt-equity ratios were at roughly half their 1915 levels, falling to .13:1 for all Brazilian firms and to .22:1.00 for Rio de Janeiro and Distrito Federal firms. The most important source of new investment capital was retained earnings (the reinvestment of profits), which accounted for 48 percent of new additions to capital for all Brazilian firms and for 56 percent for Rio de Janeiro and Distrito Federal firms. The remainder of new capital spending was made up of new equities issues by already established companies and the founding of new firms, particularly in the state of Sao Paulo.[20]

These patterns arc mirrored by a micro-level analysis of 15

Rio and D.F. firms that I have traced across the 1905, 1915 and 1927 censuses. This study of same-firm financing controls for the possible effects of the entry and exit of firms in the aggregate analysis. In these 15 large scale, publicly traded firms, new debt issues accounted for 63 percent of net new investment between 1905 and 1915. By 1915, 13 of the 15 firms had gone to the bond market (compared to seven of the 15 in 1905), producing an average debt-equity ratio of .39:1.00, up from .15:1.00 in 1905. Between 1915 and 1927, however, only 12 percent of these firms' new additions to capital were financed by new bond debt. Most of their expansion (59 percent) was financed out of retained earnings, while new equity issues accounted for 29 percent of new capital spending. Thus, their average debt-equity ratio fell to .23 in 1927, less than 60 percent of its 3.915 level.[21]

This slowing in both the rate of growth of new stock and bond issues is most likely explained by the impact of the First World War. In the first place, the war set off a wave of inflation in Brazil. This would have discouraged investors from purchasing bonds, because securities with fixed rates of interest are extremely unattractive in an economy characterized by inflationary expectations. Second, the two main sources of growth of the pre-war Brazilian economy, foreign capital inflows and Brazilian primary product exports, were cut off by the onset of the conflict. Domestic demand for textiles, which was probably highly income elastic, therefore fell, producing a decline in corporate profitability. Though this proposition

needs to be tested empirically, it is clearly the case that dividend payments to shareholders slowed substantially during the war, with some major firms failing to pay'out profits at all, indicating that corporate profits were weak.[22] The result would have been a dampening of the investment community's enthusiasm for new securities issues by the textile industry during the war and immediately thereafter.

In short, Brazilian textile industrialists were limited in their *sources* of finance throughout most of the nineteenth century. Beginning in the late 1880s, however, regulatory reforms brought about important innovations in financial intermediation that made access to institutional sources of finance relatively easy for many entrepreneurs. Even though the development of these new sources of finance was slowed by the First World War, it still produced an extraordinarily large and well integrated capital market by the standards of developing economies at the time.

Mexico's experience stands in stark contrast to that of Brazil. Like their Brazilian counterparts, Mexican textile entrepreneurs could only mobilize capital though kinship networks and reinvested profits until the end of the nineteenth century. Unlike Brazil, however, the opening of the capital markets in Mexico at the end of the century was far more limited.

Institutional lending to industry was largely absent in Mexico until the 1880s. A rudimentary banking system with specialized institutions and stable practices did not even begin

to develop until 1864, with the opening of the Banco de Londres y Mexico (a branch of the London Bank of Mexico and South America, Ltd.), and it then proceeded very slowly. By 1884 only 7 other banks were in operation, and as late as 1911 Mexico had but 47 banks, only 10 of which were legally able to lend for terms of more than a year. The few banks able to make long-term loans existed primarily to finance urban and rural real estate transactions; in fact, they had a great deal of difficulty generating their own capital.[23]

Not only were there few banks, but the level of concentration within this small sector was very high. In 1895, three banks--the Banco Nacional de Mexico, the Banco de Londres y Mexico, and the Banco Internacional Hipotecario accounted for two-thirds of the capital invested in the banking system. The first two banks issued' 80 percent of the bank notes in circulation. Even as late as 1910 the same two banks dominated the credit market, accounting for 75 percent of the deposits in Mexico's nine largest banks and roughly one-half of all bank notes in circulation.[24] If anything, the years after- 1910 saw an increase in concentration, as the Mexican Revolution in that year threw capital markets into disarray, destroyed the public's faith in paper money, and put a brake on the development of the banking sector until the late 1920s.[25]

The result of Mexico's slow and unequal development of credit intermediaries was that most manufacturers could not obtain bank financing. Even those that could only succeeded in getting short-term loans to cover working capital costs. Thus,

the Banco Nacional de Mexico provided credit to a number of large industrial establishments in which its directors had interests. These included five of the nation's largest cotton textile producers, its largest wool textile mill, and the two firms that held monopolies on the production of newsprint and explosives. But even these insider loans constituted a small part of the total capital of those manufacturing firms. An analysis of the balance sheets of three of the country's largest cotton textile producers during the period from 1907 to 1913 indicates debt-equity ratios averaging .20:1.00. None of this debt was the product of the kind of long-term bond issues that Brazilian firms were carrying out at this time.[26] Even if we ignore this crucial difference, and also ignore the fact that the Brazilian debt-equity ratios that I have constructed from census data do not include short-term debt and are therefore downward biased, the debt-equity ratios of Mexico's large-scale, publicly traded industry leaders were less than half that of their Rio de Janeiro/Distrito Federal counterparts.

Equity financing through the creation of a publicly-held, joint stock company was also unknown in the Mexican textile industry until the 1890s. Even after the first industrial companies appeared on the Mexico City stock exchange, however, the use of the exchange to raise equity capital remained limited. By 1908 only 14 industrials were traded on the exchange: no new firms joined their ranks until the late 1930s. Of those few industrial companies only four were cotton manufacturers. Thus, of Mexico's 100 cotton textile firms in

1912 (controlling 148 mills), only four percent represented publicly traded joint stock companies, a small fraction of the 32 percent of textile firms that were publicly traded in Brazil.[27]

The reason that capital markets were so late in developing in Mexico and then grew in such a limited way was largely owing to three factors. The first was the small size of the Mexican economy. Mexico's per capita income was extremely low (roughly one-seventh of that of the United States throughout most of the nineteenth century) and unequally distributed, meaning there was probably very little to capture in the way of investable funds outside of a relatively small group of wealthy merchants, miners, and landowners.

The second factor was the politicized nature of defending property rights and enforcing contracts. Personal ties to members of the government were essential for entrepreneurs to obtain the rights to official monopolies, trade protection, government subsidies, or favorable judicial rulings. Indeed, it was almost impossible to do business without resorting to political machinations.[28] This problem was most severe during the early and mid-nineteenth century, when the government changed hands on an almost semiannual basis; access to those wielding the political power necessary to defend property rights thus constantly shifted. But it was equally a problem during the Porfiriato, when only well-established financiers with clear ties to the Díaz regime appear to have been successful in floating equity issues. The inclusion of important political

actors on the boards of the major joint stuck industrial companies (including the brother of the treasury secretary, the minister of war, the president of congress, the undersecretary of the treasury, and even the son of the president) suggests the importance of those ties to the investment community. Further cementing (and demonstrating) those ties was the fact that many of Mexico's most successful financial capitalists not only served on various government commissions and represented the government in international financial markets, but also organized rallies for Porfirio Díaz's (always successful) election campaigns.[29]

The third factor slowing the development of impersonal sources of finance was Mexico's regulatory environment. Throughout the early and mid-nineteenth century, the lack of modern commercial and incorporation laws retarded the development of banks and joint stock companies. No body of mortgage credit laws was written until 1884, and it was not until 1889 that a general incorporation law was established. Thus, for most of the century it was extremely difficult to enforce loan contracts and establish joint stock companies.

Even when those laws were in place, however, new restrictive banking regulations prevented the widespread development of credit institutions. The Mexican government favored the nation's largest bank, the Banco Nacional de Mexico, with all kinds of special rights and privileges. These included reserve requirements that were half that demanded of other hanks, the sole right to serve as the government's intermediary

in all its financial transactions, a monopoly for its notes for the payment of taxes or other fees to the government, an exemption from taxes, and the sole right to establish branch banks. At the same time that the government created this privileged, semiofficial institution, it erected significant barriers to entry for competing banks, including extremely high minimum capital requirements (originally 500,000 pesos, later raised to 1,000,000), high reserve requirements (banks were required to hold one-third the value of their bank notes in metallic currency in their vaults and an additional third in the treasury), a prohibition on creating new banks without the authorization of the secretary of the treasury and the Congress, a prohibition on foreign branch banks from issuing bank notes, a 5 percent tax on the issue of bank notes, and the restriction of bank notes to the region in which the bank operated.[30] Making the situation even more problematic was the revision of these banking laws every few years. The result was a legal environment that was not only restrictive but arbitrary as well.

The motivation behind these restrictive banking policies was essentially twofold. First, the Mexican government was more concerned about establishing a secure, stable source of finance for itself than it was in creating large numbers of institutions designed to funnel credit to manufacturers. Credit-short throughout its history, the government structured the credit market so as to ensure its *own* financial stability. Second, the group of financiers that controlled the Banco Nacional de Mexico also happened to belong to the inner clique of the Diaz regime

and had used their political influence to obtain a special concession that restricted market entry.

The tight regulation of banking had two important ramifications. The first was that the number of banks and the extent of their operations remained small: industrial companies could not therefore generally rely on them as a source of finance. The second was that the credit market could not serve as a source of finance for speculation on the stock exchange as it had in the United States (and as it would in Brazil). This served to further impede the growth of the Mexico City stock exchange.

Further impeding the growth of the stock exchange was the loose enforcement of financial reporting requirements. In fact, publicly traded manufacturing companies often failed to publish balance sheets in many years, even though the law required them to do so. The result was that individuals tended to invest only in those enterprises controlled by important financial capitalists with well established reputations. Two characteristics of the Mexico City stock exchange are particularly striking in this regard. First, almost all of the publicly traded industrials had well known, politically well connected financial capitalists like Antonio Basagoiti, Hugo Scherer, or Leon Signoret as directors. Second, there was very little entry and exit in the stock exchange. It was not the case that small firms tried to float issues and failed, or that small firms succeeded *in* selling equity and then went out of business. Rather, the pattern was for a few large firms to be

capitalized through the sale of equity. These firms then dominated their respective product lines well into the 1920s and 1930s.31

One might think that foreign capital would have made up for the lack of a well developed Mexican capital *market.* After all, foreign investors were pumping billions of dollars into Mexican oil wells, mines, railroads, utilities, and export agriculture. There was in fact some foreign portfolio investment in Mexico's cotton textile industry, but the phenomenon was not widespread. The reason for this lack of foreign direct investment in textiles was that manufacturing enterprises sold their output domestically, and thus earned their incomes in Mexican silver pesos. Silver, unfortunately, lost 50 percent of its value against gold during the period 1890 to 1902, meaning that the rate of return in foreign, gold-backed currency, was halved once an investor converted his Mexican dividend payments back into sterling, dollars, or francs. In fact, the one foreign company that specialized in Mexican manufacturing investments, the Société Financière pour l'industrie au Mexique fared very poorly for precisely this reason. Its franc-denominated rates of return were embarrassingly low, and its annual reports read like an apologia to its shareholders for the depreciation of the *Mexican peso.*[32] It was largely for this reason that foreign investors tended to focus on enterprises in which income was earned in foreign, gold-backed currencies, like oil extraction, mining, and export agriculture, or where the Mexican government guaranteed a pre-established rate of return, like railroading.

In short, throughout its first 100 years of existence, the Mexican cotton textile industry had to rely on kinship networks for its financing. When institutional innovations in the capital market created new opportunities for firms to obtain impersonal sources of finance, only a small group of entrepreneurs was able to benefit.

II. Finance and the Structure and Growth of the Textile Industry

What effects did these differences between Brazil and Mexico with regard to financial intermediation have on the development of the textile industry? One would expect at least three. First, the Mexican textile industry should have grown more slowly than Brazil's after 1890, because the vast majority of Mexican firms had to finance their expansion out of retained earnings, while their Brazilian counterparts had access to institutional sources of capital. Second, the limited opening of Mexico's capital market should have provided firms that had access to institutional finance with a sizable advantage over their competitors. The result should have been an increase in concentration in the Mexican textile industry. Third, the more generalized access to impersonal sources of capital in the Brazilian case should have resulted in a significant drop in concentration. The net result should have been lower levels of industrial concentration in Brazil than in Mexico.

An examination of the development of the textile industry in the two countries bears out these hypotheses. In regard to the rate of growth of the textile industry, the Brazilian

textile industry, which had been virtually nonexistent until the 1880s, surpassed Mexico's after its capital markets opened up. As late as 1882, the entire modern sector of the Brazilian cotton goods industry numbered only 41 firms running just over 70,000 spindles, less than one-third the size of Mexico's cotton goods industry (see Tables 1 and 2). This relative size relationship continued into the mid-1890s, but over the following ten years widespread access to impersonal sources of capital in Brazil meant that its cotton textile industry was able to outgrow Mexico's by a factor of five, producing for the first time an absolute size difference in favor of Brazil. By the outbreak of World War I, Brazil's industry was roughly twice the size of Mexico's, a gap which grew to three to one by the onset of the Great Depression [see Tables 1 and 2).

This is not to argue that access to capital was the only factor influencing the rate of growth of either country's textile industry. There were numerous other constraints to the development of industry in Brazil and Mexico.[33] The data suggest, however, that problems of capital mobilization played an important role in the slow development of industry in both countries during the nineteenth century. First, the fact that the textile industries in both countries witnessed a spurt of growth after impersonal sources of finance became available indicates that their lack was a constraint before 1890. Second, the fact that Brazilian industry was able to rapidly outgrow Mexican industry after its capital markets opened up certainly suggests an important role for impersonal sources of finance in

a country's rate of industrial growth.

One might argue that capital immobilities had little to do with the rate of growth of the textile industry: Demand factors were far more important in influencing industry growth. Mexico's industry was smaller and grew less quickly than that of Brazil because it had a smaller, poorer population. A comparison of national income and population estimates for the two countries indicates, however, that demand factors cannot expiain differences in observed industry size. True, Brazil's population, which was roughly equal to that of Mexico in the early 1870's (9.9 million and 9.1 million, respectively) grew at almost twice Mexico's rate up to 1910 because of Brazil's policy of subsidizing European immigration. Mexican national income, however, outgrew Brazilian national income at a similar rate during this same period. Circa 1877, Mexican national income was only 55 percent that of Brazil. By 1910, it was within six percent of Brazil's. More importantly, Mexican income per capita outgrew that of Brazil by a factor of ten. In 1877, Mexican per capita income was 75 percent that of Brazil. By 1910, Mexican income per capita was 140 percent that of Brazil.[34] Given that the income elasticity of demand for textiles was very high, Mexico likely had a much higher per capita demand for textile products than the differences in per capita income would indicate.[35] In short, it is hard to reconcile a demand side story with Brazil's lower absolute levels of per capita income and lower rates of growth of both per capita and national income.[36]

As for the effects of capital immobilities on industrial concentration, the data are unequivocal: access to capital had a significant effect on the level of concentration: Tables 1 and 2 and Graphs 1 and 2 present estimates of four-firm concentration ratios (the percent of the market controlled by the four largest firms) and Herfindahl indices (the sum of the squares of the market shares of all firms in an industry) for both countries. There are two striking features of the data.[37]

The first is that the opening of Mexico's capital markets actually produced an increase in concentration. The trend in Mexico from the 1850s to the late 1880s was a gradual decrease in concentration: exactly the trend that one would expect in an expanding industry characterized by constant returns to scale technology. As Table 1 and Graph 1 indicate, Mexico's four-firm ratio fell from a high of .449 in 1850 to a low of .160 in 1878, while the Herfindahl dropped from a .0686 to .0249 over the same period. Beginning in the mid to late 1880s, the trend reversed, even though the industry was witnessing rapid growth. By 1902, **both the four-firm ratio and the Herfindahl had nearly regained** their 1853 levels, standing at .381 and .0637 respectively. Concentration then began to decrease again to 1912, when the Revolution interceded and again reversed the trend.

The second striking feature of the data is that it indicates that the more profound opening of Brazil's capital markets produced exactly the opposite result than that obtained in Mexico (see Table 2 and Graph 1). The sharp drop in **concentration from 1866 to 1882 is clearly a mathematical**

identity, having to do with the small size of the industry *in* 1866 when there were only nine firms. What is more relevant for our purposes is that this rapid rate of decrease in concentration took off again during the years from 1895 to 1907, and then slowed only slightly to 1915, when it began to gently level off. By 1915, the estimated Herfindahl index for Brazil stood at approximately one-quarter of its 1882 value.[38]

Compared to Mexico, Brazil's textile industry was **surprisingly unconcentrated, and** became increasingly less so over time. Prior to the 1890s, Brazil's relatively small textile industry displayed higher levels of concentration than Mexico's. By 1905, however, relatively widespread access to institutional sources of capital in Brazil drove concentration **down to roughly GO percent of that in Mexico. Just prior to the** onset of the Great Depression, the level of concentration in Brazil was only 58 percent of that in Mexico measured by the four-firm ratio and only 42 percent of that in Mexico measured by the Herfindahl index.

One might argue that Mexico's higher concentration ratios had little to do with capital immobilities: high levels of concentration were produced by demand, not supply, factors. Mexico had higher levels of concentration and a different trajectory of concentration because it had a smaller textile industry than Brazil. There are two problems with this interpretation.

The first is that Mexico's industry leaders were tremendous **operations in an absolute sense. Mexico's leading firms were**

not simply large relative to the small Mexican market, they were enormous operations, even by U.S. standards. Mexico's largest firm in 1912, for example, the Compañía Industrial de Orizaba (CIDOSA), was a four-mill operation employing 4,284 workers running 92,708 spindles and 3,899 looms. Had it been located in the United States, it would have ranked among the 25 largest cotton textile enterprises. Significantly, Brazil's largest producer, the Companhia America Fabril, while a sizable operation, was actually smaller than CIDOSA: in 1915 it controlled 6 mills employing 3,100 workers running 85,286 spindles and 2,170 looms. On average, circa 1915, Brazil's four industry leaders were slightly larger than Mexico's four industry leaders if we employ spindlage as a measure of size (61,572 spindles per firm for Brazil versus 53,023 for Mexico), but this ordering is reversed if we measure size in looms (2,008 looms per firm in Mexico versus 1,908 in Brazil). Both measures, however, point to the same qualitative result: by international standards the industry leaders in Mexico gigantic operations.

The second problem with this hypothesis is that it cannot explain why Mexican concentration increased during a period when the industry was experiencing rapid growth, the years 1878-1902. Without some supply factor intervening during this period, Mexican concentration should have continued to decline, instead of jumping back up to its 1850 level.

In order to test this hypothesis in a formal manner, I constructed a simple OLS regression model that measures the

elasticity of concentration with respect to industry size. The logic of the model is the following: in an industry characterized by modest returns to scale, with no significant technological changes that would raise the minimum efficient scale of production in a discontinuous way, we should be able to predict the level of concentration simply by knowing the size of the industry.[39] Similar regression results for Brazil and Mexico would indicate that concentration was simply a function of industry size. If, however, similar specifications of the regression for each country yield different results, then some intervening variable (like an imperfection in a factor market) must have been at work.

Table 3 presents various specifications of the model. All values are converted to natural logs in order to capture how changes in the size of the industry effect the change in concentration. Concentration is measured as the Nerfindahl Index.

The first specification of the regression measures industry size as simply the number of active firms. For Brazil we obtain fairly unambiguous results: the parameter estimate for (ln)firms is -.73 with an R^2 of .98. That is, the elasticity of concentration with respect to industry size is .73 (as industry size doubles concentration decreases by 73 percent). Ninety eight percent of the movement in concentration is explained by change in industry size. For Mexico, however, the results are much less robust: the parameter estimate for (ln)firms is significantly lower (-.44) and the R^2 is only .17. The low R^2

indicates that the regression explains very little of the movement of concentration. In short, the results indicate that in Brazil we can predict concentration from industry size with a great deal of certainty, but in Mexico we cannot (see Table 3).

Perhaps it is the case that the number of firms is a poor proxy for industry size. The second specification of the regressions therefore substitutes the natural log of the number of active spindles as the independent variable. This specification again yields robust results for Brazil, but again fails to serve as a meaningful predictor of concentration in Mexico. For Brazil the parameter estimate on (ln)spindles is -.38 with an R2 of .71. For Mexico, the parameter estimate is only -.09 and R2 is only .04, indicating no correlation at all between the two variables.

Both of these specifications assume that spindles and firms are collinear. The third specification of the regression does away with this assumption, and includes both size measures *on* the right hand side of the equation, For Brazil we get an extraordinarily good fit. The parameter estimate is -.02 for (ln)spindles and -.70 for (ln)firms. R2 is .98. Since the combined elasticities are actually lower than for (In) firms alone, it appears that firms and spindles are collinear. This makes perfect sense in an industry characterized by modest returns to scale and low barriers to entry. As the industry grows, the number of firms does as well.

The Mexican results, however, again indicate that concentration cannot be explained by industry size. While the

third specification of the regression yields a high parameter estimate of -1.28 for (ln)firms, the parameter estimate for (ln)spindles points the wrong way (.50). Most of the variance around the mean cannot be explained by the regression: R^2 is .38. What is particularly striking is that this specification indicates that (ln)spindles and (ln)firms were not collinear in Mexico, as they were in Brazil, suggesting that in Mexico an industry that a priori should be characterized by modest or constant returns to scale was behaving like an industry characterized by sizable increasing returns to scale.

In short, all three specifications of the regressions indicate that concentration in Brazil was a function of industry size, but in Mexico it was not. A glance at Tables 1 and 2 and Graphs 1 and 2 quickly indicate why it was not: in many years in post-1890 Mexico concentration actually increased as industry size grew. Some other intervening variable influenced concentration in Mexico.

What would Mexican industry have looked like, in terms of its structure, had this other intervening variable not been operating? Assuming that in the absence of this intervening variable the same relationship between industry size and industry structure would have held for both Brazil and Mexico, estimating Mexico's predicted level of concentration is a straightforward operation. It simply entails estimating a predicted Herfindahl series using the Brazilian coefficients from the first regression (see Table 3, above) and the actual Mexican data on the number of firms.[40]

Table 4 and Graph 3 present these predicted Herfindahl values for Mexico, as well as the actual Mexican and Brazilian series. There are two features about the predicted series that are notable. The first is that until the early 1890's the fitted series does a reasonably good job of predicting the movement of concentration in Mexico, indicating that the statistical relationship between industry size and concentration observed in Brazil held in Mexico as well until its capital markets opened up. The second is that after 1893 Mexico's actual and predicted Herfindahl values moved in entirely different directions. By 1902, the actual level of concentration in Mexico was more than twice its predicted value.

What mechanisms were at work causing Mexico's level of industrial concentration to increase during a period of rapid expansion? Why did the levels and trajectories of concentration in Mexico reverse in the 1890's, and why did it resume its fall after 1902?

The answer to these questions basically turns on the effects of the limited **opening of Mexico's capital markets.** In the years after 1889 Mexico's big, multi-plant, industry leaders (the CompaAia Industrial de Orizaba, CompaAia Industrial Veracruzana, CompaAia Industrial de Atlixco, and CompaAia Industrial de San Antonio Abad) were founded with capital **provided by the Mexico City stock cxchangc. These firms were** able to purchase newer, more efficient equipment faster than their smaller competitors who did not have recourse to the sale of equity. They therefore had both a size advantage (meaning

they could threaten to lower prices) and a productivity advantage (the large, new firms were 31 percent more productive than their smaller competitors--see Table 4). The result was increasing levels of concentration.

Why then did concentration drop in the years from 1902 to 1912? Why did the industry leaders not continue to exercise market dominance? The answer is that after they achieved control of the market, Mexico's industry leaders dramatically **slowed their rate of new investment. A comparison of the 1895** and 1912 cross sections indicates that firms that had access to the capital market did not purchase new machinery at a faster rate than did non-capital market firms. In fact, a comparison of firms extant in both censuses indicates that, if anything, firms that did not have access to impersonal sources of capital purchased new machinery at a faster rate than firms that had access to the capital market.[41] Under a set of assumptions that minimizes the replacement of old equipment by new equipment (thereby biasing downward the total addition of new machinery), the non-capital market firms purchased new looms at a rate roughly equal to that of the capital-market firms and purchased new spindles at a rate more than 50 percent faster. Under a set of assumptions that maximizes the replacement of old machinery by new machinery (thereby biasing upwards the total addition of new machinery), the non-capital market firms purchased new looms at a 13 percent faster rate than capital market firms and new spindles at a 35 percent faster rate.

These results are consistent with estimates I have made of

total factor productivity differentials in the 1895 and 1912 census years. As table 4 demonstrates, in 1895 non-capital market firms were significantly less productive than capital market firms (1,360 pesos in sales per input of capital and labor, versus 1,776 pesos per input of capital and labor, a difference of roughly 31 percent). By 1912, however, these differences had decreased substantially. Sales per input of labor and capital stood at 1,686 pesos for non-capital market firms and at 1,824 pesos for capital market firms, a difference of only eight percent.

In short, the data indicate that the handful of firms that were able to mobilize capital through institutional sources gained a one-time advantage over their competitors. They then sat back and watched their- rents dissipate as their smaller competitors gradually closed the productivity differential through the reinvestment of retained earnings. Why they pursued this strategy is somewhat of a mystery at this point. It may have been that their managers perceived (incorrectly) that their ability to mobilize institutional sources of capital would have served as a disincentive to new entrants. Potential new entrants would, according to this rationale, have seen that the industry leaders could rapidly install excess capacity, thereby increasing production and lowering prices below the potential entrant's long run average cost curve. It might also have been that the rates of return available from the big, multi-plant mills were disappointing to the investment community. New infusions of equity capital may therefore have dried up after

1302. Or it may have been that stockholders did not trust the management of the enterprises or were operating with a short time horizon. They therefore demanded that all profits be paid out as dividends.

Whatever the source of this peculiar behavior by the industry leaders, the lack of new investment on their part, coupled with the relatively slow rate of growth of new investment implied by the need to finance new plant and equipment purchases out of retained earnings by their competitors, suggests that the overall rate of growth of investment and productivity in Mexico must have been low relative to Brazil and its other international competitors. Work in progress hopes to shed light on this issue.

III. Conclusions

What lessons are there to be drawn from this story about government regulation, capital market development, and the growth and structure of industry?

The first is that government regulatory policies had a significant effect on the growth of capital markets in Brazil and Mexico. The divergence in capital market development between the two countries was clearly the result of different policies regarding the formation of banks, the operation of banks, the reporting of financial data, and the reporting of stockholder identities. In short, capital market development was not completely endogenous to the process of economic growth: government regulation have historically exerted powerful

independent effects.

Second, differences in capital market development had a significant impact on the rate of growth and structure of industry. Mexico's financial system, in which a small group of entrepreneurs could get access to impersonal sources of capital while most entrepreneurs could not, gave rise to a small textile industry relative to Brazil. The rapid expansion of the Brazilian textile industry after the opening up of the capital markets in the late 1880's underlines the **important role played** by access to finance in industrial growth. In sum, lack of access to institutional sources of capital because of poorly developed capital markets was a non-negligible obstacle to industrial development in the nineteenth century.

Third, imperfections in capital markets also had a significant effect on the structure of industry. The much more limited opening of the Mexican capital market gave rise to higher levels of concentration than in Brazil, suggesting that Mexican textile firms operated in a less competitive environment.

Fourth, the data analyzed to date suggest that Mexico's peculiarly uncompetitive structure of industry may have created disincentives to new investment by its industry leaders. Tn addition, the need to rely on retained earnings to finance most new investment would suggest that in general Mexico's rate of growth of investment was much slower than in countries, such as Brazil, that had more open capital markets. The result may well **have been much slower rates of growth of productivity in the**

Mexican case, meaning that Mexican industry may have become increasingly less competitive over time. Work in progress hopes to shed light on this issue,

Fifth, a great deal of the difference between Mexico and Brazil was political. Mexico followed repressive capital market regulatory policies in large part because it was a centralized dictatorship. Banks were slow to develop because of restrictions on their founding and operation in order to protect the interest of an in-group of financial elites. Similarly, the politicized nature of doing business in Porfirian Mexico, coupled with the lack of good financial and stockholder information, meant that individuals were reluctant to invest in enterprises in which they lacked direct knowledge or control. The only way around these problems was to invest in enterprises directed by entrepreneurs with clear ties to the reins of political power. As a result, the corporate form of ownership spread slowly. In short, there may well have been economic, as well as social, costs to the Díaz regime.

Table One

Size and Structure of the Mexican Cotton Textile Industry, 1843–1929

Year	Firms Listed	Firms With Useful Data	Active Spindles	Four Firm Ratio	Mexico Herfindahl Index
1843	52	51	95,208	0.376	0.0524
1850	51	51	135,538	0.449	0.0686
1853	36	36	121,714	0.430	0.0677
1862	40	40	129,991	0.319	0.0490
1865	52	52	151,722	0.342	0.0501
1878	81	81	249,294	0.160	0.0209
1883	83	83		0.189	0.0225
1888	**110**	**31**	**243,561**	**0.217**	**0.0243**
1891	80	78		0.228	0.0268
1893	89	83	351,568	0.284	0.0355
1895	85	85	411,090	0.363	0.0480
1896	97	83	397,767	0.371	0.0513
1902	109	109	595,728	0.381	0.0637
1906	106	106	688,217	0.338	0.0486
1912	100	100	749,949	0.271	0.0343
1919	88	88	735,308	0.374	0.0592
1929	123	123	839,109	0.278	0.0335

Sources: Secretaria de Hacienda y Crédito Público, Documentos, p. 81; Ministerio de Fomento, Estadistica del Departamento, table 2; Ministerio de Fomento, Memoria (1857), docs. 18-1, 18-2; Direccidn de Colonización e Industria, Memoria (1850); Perez Herndndez, Estadistica; Ministerio de Fomento, Memoria (1865), pp. 438-40; Secretaria de Fomento, Boletin Semestral de la República Mexicana. 1889; Secretaria de Fomento, Anuario Estadistico de la República Mexicana, 1893; Secretaria de Fomento, Anuario Estadistico de la República Mexicana, 1895; Secretaria de Hacienda, Memoria, 1895; Archivo General de la Nación, Ramo de Trabajo, caja 5, legajo 4; Secretaria de Hacienda, Boletín, second semester 1919, first semester 1920, Jan. 1930; La Semana Mercantil, June 23, 1902 and June 25, 1906; Haber, Industry and Underdevelopment, pp. 125, 158.

Table TWO

Size and Structure of the Brazilian Cotton Textile Industry

Year	Active Firms	Firms With Useful Data	Active Spindles	Four Firm Ratio	Herfindahl Index
1866	9	9	14,875	.766	.1773
1882	41	30	70,188	.376	.0631
1883	44	33	65,937	.371	.0582
1895	43	27	169,451	.349	.0585
1905	98	80	734,928	.207	.0279
1907	117	115		.203	.0250
1915	180	168	1,492,822	.161	.0165
1327	273	231	2,634,293	.162	.0141
1934	266	247	2,700,228	.173	.0168

Source: Borja Castro, "Relatorio do Segundo grupo," pp. 3-73; Commissao de Inquerito Industrial, Relatorio ao Ministerio da Fazenda; Ministerio da Indústria, Viaçao e Obras Publicas, Relatorio, 1896; Vasco, "A industria do algodao"; Centro Industrial do Brasil, 0 Brasil; Centro Industrial do Brasil, O Centro Industrial; Centro Industrial de Fiacao e Tecelagem de Algodao, Estatisticas da indústria; and Stein, Brazilian Cotton Textile Manufacture, appendix 1.

Table 3

Alternate Specifications of Industrial Concentration Regressions

Mexico (1843-1929) and Brazil (1866-1934)

Dependent Variable: (ln) Herfindahl Index
T statistics in parentheses

	Mexico			Brazil		
	Spec. 1	Spec. 2	Spec. 3	Spec.1	Spec. 2	Spec.3
Intercept	-1.28	-1.92	-3.83	-.29	1.65	-.11
(ln) firms	-.44		-1.29	-.73		-.70
	(-1.73)		(-2.58)	(-18.41)		(-8.38)
(ln) spindles		-.09	.50		-.38	-.02
		(-0.74)	(1.97)		(-14.37)	(-.47)
R2	.17	.04	.38	.98	.71	.98
N	17	15	15	9	8	8

Source: See tables 1 and 2.

Table 4

Actual and Predicted Herfindahl Indices,
Mexico and Brazil 1843-1929

	ACTUAL MEXICO	PREDICTED MEXICO	ACTUAL BRAZIL
1843	.0524	.0431	
1850	.0686	.0431	
1853	.0677	.0555	
1862	.0490	.0514	
1865	.0501	.0425	
1866			**.1773**
1878	[illegible]	.0308	
1882			.0631
1883	.0225	.0303	**.0582**
1888	.0249	.0283	
1891	.0268	.0317	
1893	.0355	.0303	
la95	.0480	.0297	.0585
1896	.0513	.0303	
1902	.0637	[illegible]	
1905			.0279
1906	.0486	.0253	
1907			.0250
1912	.0343	.0264	
1915			.0170
1919	.0592	.0290	
1927			.0141
1929	.0335	.0227	
1934			.0168

SOURCE: Actual data from tables 1 and 2. Predicted data from regression model on actual Brazilian data. For regression results see specification one in table 3 above. Actual Mexican data on firms then plugged into the regression model to produce predicted Herfindahls.

Table 5

Estimates of Total Factor Productivity By Firm Type

Mexico 1895 and 1912

(Current Pesos)

	Mexico 1895	Mexico 1912
Capital Market Firms	1,776	1,824
Non-Capital Market Firms	1,360	1,686
Differential	31%	8%

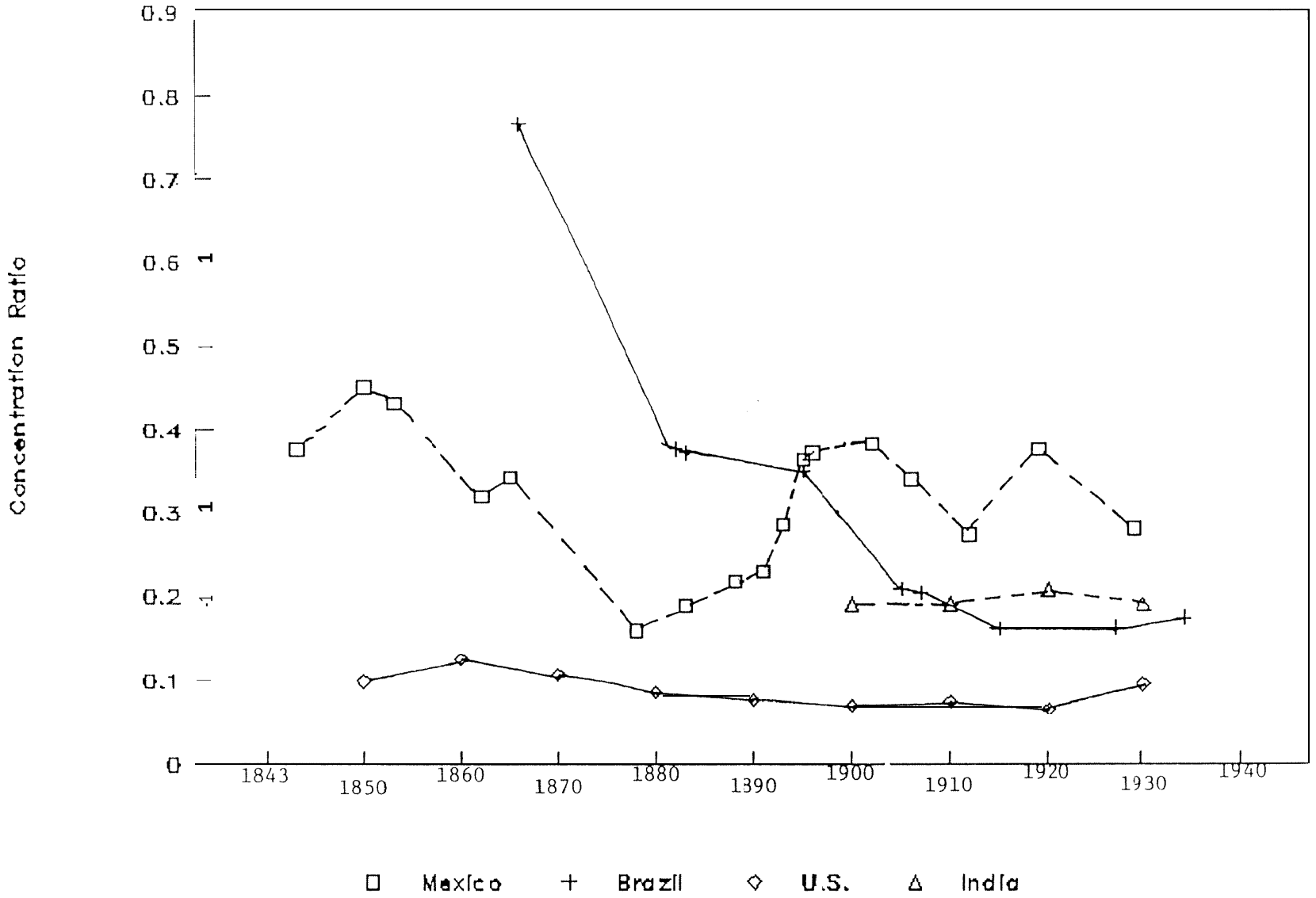
Sources: Archivo General de la Nación, caja 5, legajo 4; Secretaria de Fomento, Anuario Estadistico de la República Mexicana, 1895.

Weights for estimating factor productivity are from Cobb-Douglas production functions for each cross section. Results are not comparable from year to year, but are meant solely to capture the productivity differentials between capital market and non-capital market firms within each cross section. The production functions were specified as $Q=f(k,l)$, where Q = the natural log of the value of output, k = the natural log of capital measured as looms, and 1 = the natural log of labor measured as workers. This produced elasticities of .548 for capital and .510 for labor in 1895 (T was 4.72 and 4.30, respectively, and R^2 was .85), and .096 for capital and .875 for labor in 1912 (T was .54 and 4.68 respectively, and R^2 was .72). The elasticities of k and 1 were normalized to 1 in order to estimate TFP. Note that production functions imply modest returns to scale in 1895 (6%) but slightly negative returns to scale (-3%) in 1912.

Sources: See table 1.

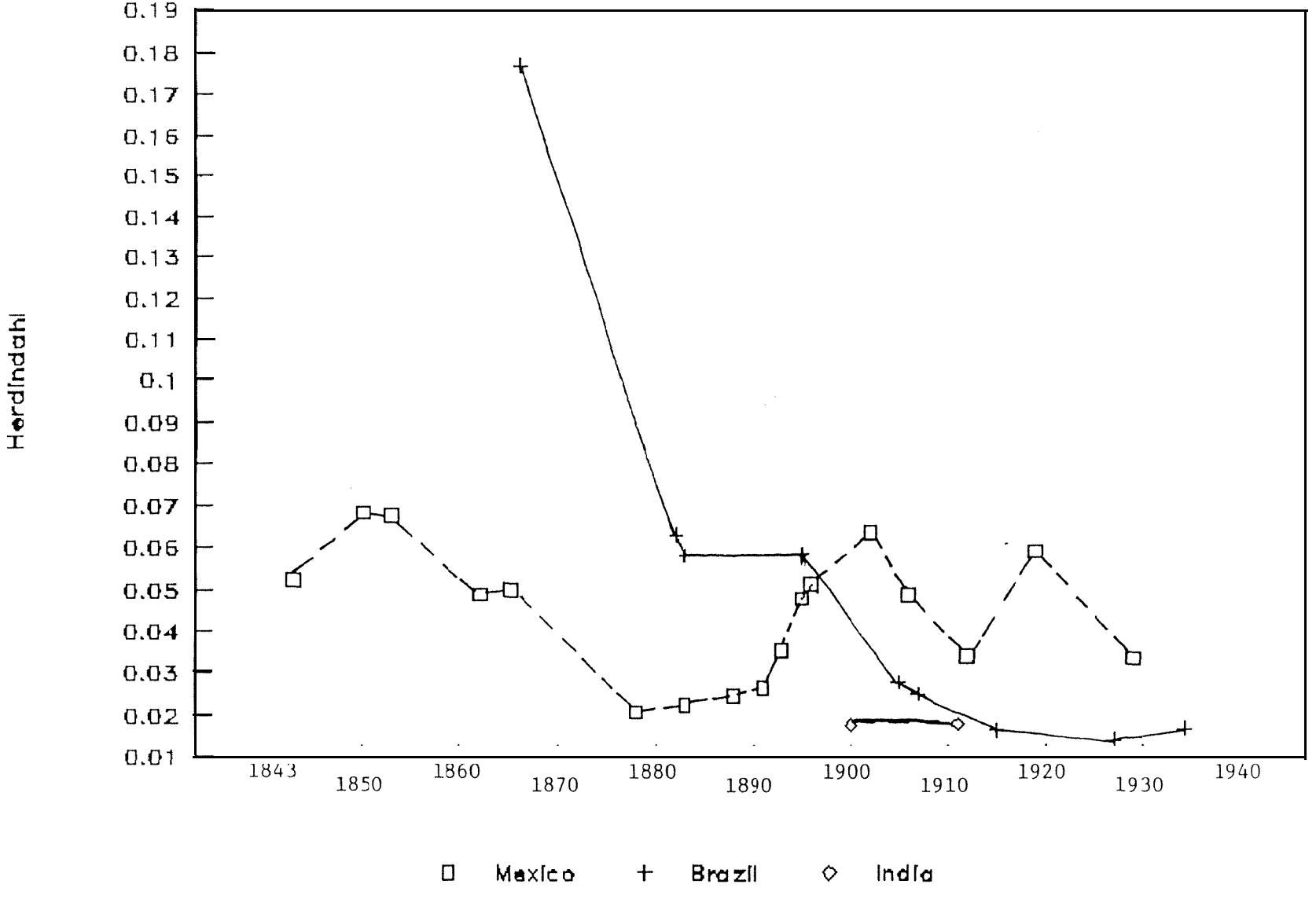
GRAPH ONE

Four Firm Concentration Ratios



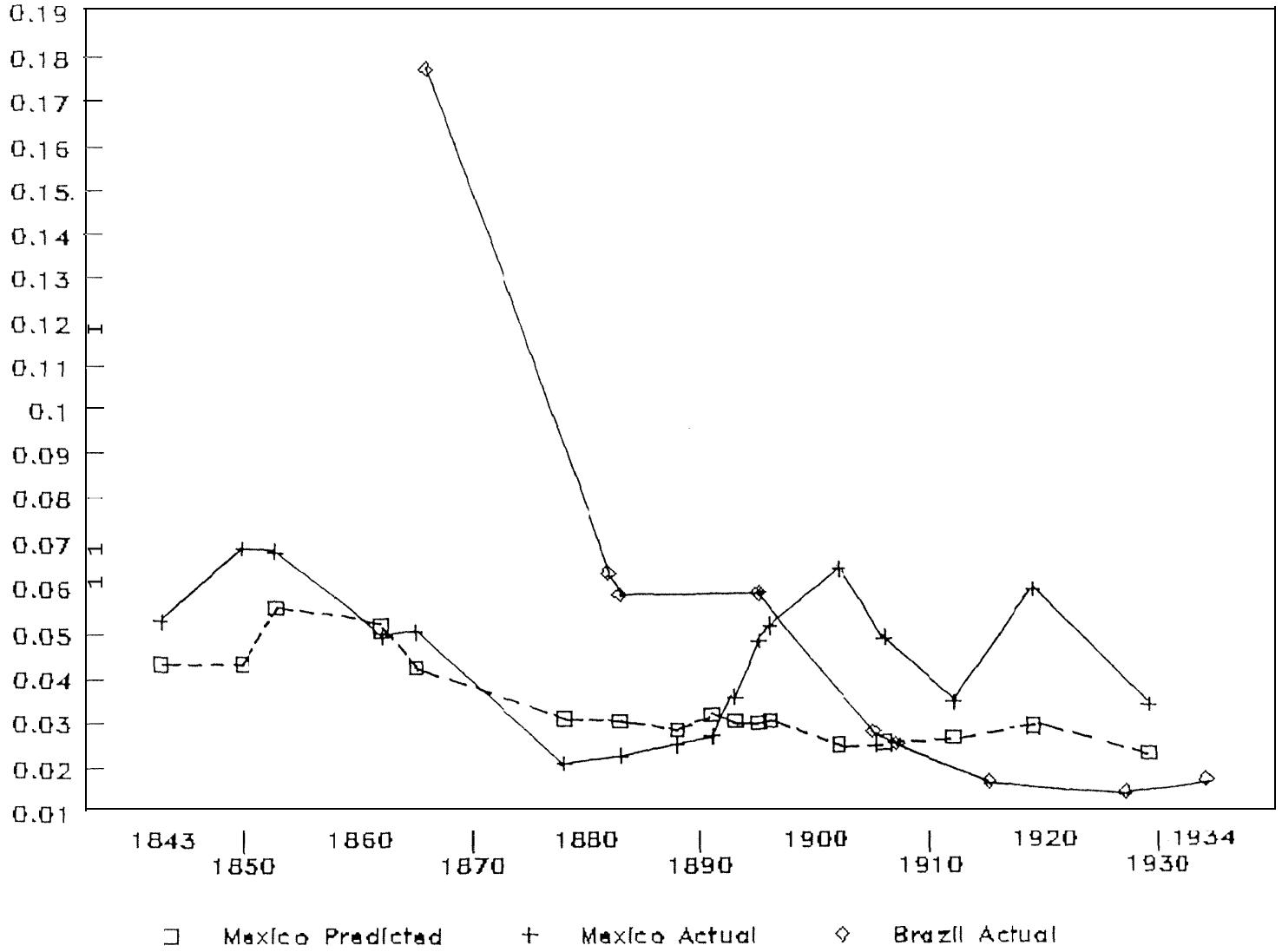
GRAPH TWO

Herfindahl Indices



GRAPH THREE

Herfindahl ndices, Actual & Predicted



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1. On capital markets and industrial structure see the seminal articles by Davis, 1963; Davis, 1966. On the role of regulatory regimes in structuring financial markets see: Sylla, 1975; Lamoreaux, 1986; McKinnon, 1973. On the distributive effects of capital market imperfections, see Roe, 1979.

2. The term capital market refers to the organized process by which funds for long-term investment are raised, distributed, traded, and valued. During the period under study, this process typically took place through banks, stock exchanges, and bond markets. In a "perfect" capital market, all enterprises with a rate of return that exceeds the rate of interest will receive financing. All capital markets depart from this ideal. In highly imperfect markets, however, the tendency for profitable firms to lack access to institutional sources of finance is highly pronounced, because the institutions that channel the savings of people who have liquid wealth to those who need it for investment in business enterprises are poorly developed. In a highly imperfect capital market, therefore, there are many potentially profitable enterprises that cannot obtain access to external financing and many savers who earn lower rates of return on their investments than they would otherwise. For an excellent discussion of capital markets in history see Smith and Sylla, 1993.

3. Marichal, 1986; Ludlow, 1986; Levy, 1977; Quiroz, 1993, Fur a recent study that directly links government policies to the development of financial markets in Mexico, see Marichal,

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4. This lack of a theoretically informed literature on the historical development of Latin American financial markets is particularly peculiar given the interest of Latin Americanists in issues such as the *region's late* and incomplete industrial development, its modest degree of social and economic mobility, the concentration of economic power in the hands of small and persistent elites, and the tendency to high levels of monopoly and oligopoly--all of which are directly related to the existence of capital market imperfections.

5. The term industrialized here refers to the spread of the mechanized factory. By the mid-nineteenth century, mechanized factories were producing cotton goods in both countries, and by early in the twentieth century the mechanized factory system had spread into other products, including cement, steel, paper, glass, beer, chemicals, explosives, shoes, and wool textiles. The arrival of the mechanized factory in most product lines appears to have occurred earlier in Mexico than in Brazil, but *both* countries led the rest of the region, where most industrial goods continued to be produced in workshops and non-mechanized manufactories until the 1920s. For a discussion of the industrial histories of the two countries see Suzigan, 1986; Haber, 1989.

6. As Kuznets pointed out, textiles tend to be the first *manufacturing* industry to develop as economies modernize. Mexico and Brazil conformed to this general pattern. See :

Kuznets, 1971: 111-113.

7. This does not mean that scale economies were insignificant in textile production. Indeed, had economies of scale been negligible, access to capital could not have served as a barrier to entry, and the argument developed here would not hold. It does mean, however, that scale economies in textiles were exhausted at relatively small firm sizes compared to such industries as steel, cement, and chemicals. In these industries, scale economies were so large that they precluded more than a few firms from operating at the optimal level of production.

8. while 1 focus on cotton textiles, it is quite likely that the same mechanisms at work in that industry held throughout the rest of the industrial sector.

9. Topik, 1987: 28; Peláez and Suzigan, 1976, chaps. 2-5; Saes, 1986: 73; Levy, 1977: 109-12; Stein, 1957: 25-27.

10. Sylla, 1975: 52, 209.

11. Levy, 1977: 117; Peláez and Suzigan, 1976: 78-83, 96-97; Saes, 1986: 22, 86.

12. shareholder lists were not published in the abbreviated reports reprinted in the Jornal do Commercio or the Diario Official, but they were published in the original annual reports.

13. Topik, 1987: 28-31; Peláez and Suzigan, 1976: 143; Stein, 1357: 86.

14. Levy, 1977: 117, 245.

15. Calculated from: Centro Industrial do Brasil, 1917; Levy, 1977: 245, 385. The peak number of publicly traded textile firms was reached in 1922, when 64 textile issues traded on the Rio exchange. By 1927 this had fallen to 52 firms, as the slow growth of the Brazilian economy in the early 1920s forced out weak firms.

16. Topik, 1987: 52; Triner, 1990: 4, 7, 12; Neuhaus, 1975: 22.

17. During the period under study, Rio de Janeiro was Brazil's capital. The Distrito Federal (Federal District), comprised the area immediately around the city of Rio, much the way that the District of Columbia encloses the city of Washington. Sorrounding the Distrito Federal was the state of Rio de Janeiro.

18. The averages reported are weighted by the size of each firm's total capital investment. These debt-equity ratios do not include short term bank debt or accounts payable, which would have raised the ratios even higher. The censuses did not report these other sources of debt. Estimates of new investment and its sources computed from Vasco, 1905; Centro Industrial, 1917; Centro Industrial 1927; Centro Industrial 2934.

19. Centro Industrial, 1917; Davis, 1957: 200-202.

20. Calculated from Vasco, 1905; Centro Industrial, 1917; Centro Industrial, 1927. All averages are weighted by the value of capital.

21. Calculated from Vasco, 1905; Centro Industrial, 1917;

Centro Industrial, 1927. All averages are weighted by the value of capital. Rio and Distrito Federal firms were-chosen for study because the county's stock and bond markets were located there. The firms are the Companhia Petropolitana, companhia Mageense, Companhia Fabril Sao Joaquim, Companhia Manufactora Fluminense, Companhia Corcovado, Companhia Brasil Industrial, Companhia Confianca Industrial, Companhia Cometa, Companhia Sao Pedro de Alcantara, Companhia Dona Izabel, Companhia Alliança, Companhia Progreso Industrial do Brasil, Companhia Industrial Campista, Companhia Nova Fabrica Santo Aleixo, and the Companhia America Fabril.

22. I am currently constructing estimates of the rote of return on capital for a sample of 15 large, publicly traded textile manufacturers covering the period 1890 to 1938 to test this proposition.

23. Marichal, 1986: 251. Sanchez Martinez, 1983: 60, 76-77; Haber, 1989: 65.

24. Sanchez Martinez, 1983: 81-82; and Marichal, 1986: 258.

25. Cdrdenas and Manns, 1989.

26. Sanchez Martinez, 1983: 86; Haber, 1989: 65-67.

27. The activity of the Mexico City stock exchange was followed by Mexico's major financial weeklies: La Semana Mercantil, 1894-1914; El Economista Mexicano, 1896-1914; Boletín Financier0 y Minero, 1916-1938. The behavior of the shares of these firms is analyzed in Haber, 1989; chap. 7. The total number of firms is from textile manuscript censuses in Archivo

General de la Nación, Ramo de Trabajo, caja 5, legajo 4 (also see caja 31, legajo 2).

28. Coatsworth, 1978: 98. For a discussion of the politicized nature of the legal system see Walker, 1986: chaps. 1, 4-5, 7-8.

29. For a discussion of the activities of these entrepreneurs see Haber, 1989: chaps. 5, 6.

30. When the first minimum was established in 1897, it was equal to $233,973 U.S. The increase in 1908 brought the minimum capital requirement up to $497,265, roughly five times the minimum for nationally chartered banks in the United States. For a discussion of these various privileges and barriers to entry, as well as changes in banking laws, see Sanchez Martinez, 1983: 43, 61-62, 67; Ludlow, 1986: 334-36; Bátiz V., 1986: 286, 287, 293.

31. Examples can be found in the steel, beer, soap, dynamite, cigarette, wool textile, and paper industries, in addition to cotton textiles. See Haber, 1989: chaps. 4, 5.

32. The annual reports of the Société Financière pour l'industrie au Mexique can be found in La Semana Mercantil, 8 Aug. 1903; El Economista Mexicano, 11 Oct. 1902, 6 July 1904, 4 Aug. 1904, 21 Oct. 1905, 18 Aug. 1906.

33. For a discussion of these constraints in Mexico see Haber, 1989: chaps. 3-5; for a discussion of the Brazilian case see Stein, 1957; Suzigan, 1986.

34. National income data from Coatsworth 1978: 82.

Population data from Instituto Nacional de Estadistica, Geografia, e Informática 1985:9; Instituto Brasileiro de Geografia e Estatística 1987: 33.

35. Contemporary observers noted this high income elasticity of demand for textile products. Their observations can be found in Haber 1989: 28-29.

36. Accounting for imports and exports of textiles would not affect these results. Neither country exported much in the way of textile products, their national industries being no match for British and American manufacturers. Both countries were also highly protectionist, with tariffs exceeding 100 percent. In both countries, imports accounted for roughly 20 percent of consumption by 1910, and this proportion declined thereafter. These imports were almost entirely high value, fine weave goods.

37. These estimates of concentration are all calculated at the firm level. This involves combining the market shares of all mills held by a single corporation, partnership, or sole proprietor. Market shares were calculated from estimates of the actual sales or value of output of mills. In years where only data on installed capacity was available, I calculated the distribution of installed capacity and used this data to estimate market shares. These estimates were based on a regression of market shares on the distribution of installed capacity for those years where both variables were available.

38. These ratios were constructed to bias the results

against the hypothesis that Brazil had higher levels of concentration than Mexico. A detailed discussion of the method is available from the author. One might argue that these differences in concentration would disappear if imports of foreign textiles were accounted for, but that argument does not stand up to the empirical evidence on textile imports. Indeed, both Brazil and Mexico followed highly protectionist policies after 1890, virtually eliminating imported cloth except for fine weave, high value goods.

39. The model makes the reasonable assumption that Brazil and Mexico had similar levels and distributions of income and similar income elasticities of demand for textiles. The model does allow for a gradual increase in minimum efficient scales. For this reason, it is unlikely that the elasticities of the size variables will sum to unity. In any event, there were no discontinuous jumps in textile manufacturing technology during the period that affected the Brazilian or Mexican industries. The only major innovation was the Northrup automatic loom, which was developed in the 1890s. But the Northrup loom was not widely adopted in either country (there were only 25 of them in service in Mexico as late as 1910). Moreover, to the extent that there were technological jumps, these would be more pronounced in the Brazilian regressions than in those for Mexico, because of Brazil's faster purchase of new capacity. This would tend to bias the results against the hypothesis advanced here.

40. This is an upper bound prediction. The model. assumes that Mexico's industry size would have been the same in the presence of a better developed capital market, which is highly unlikely. Had th size of the industry been larger, the predicted concentration ratios would have been even lower than those estimated here. The first specification of the regression was used because it provided the best statistical fit for both the Mexican and Brazilian cases.

41. The method employed was to include in the sample all firms that appeared in both censuses, as well as firms that were founded after 1895 but that purchased factories that were extent in the 1895 census. Firms were not included if they went out of business and permanently closed their factories after 1895, or if they were founded after 1895 and built entirely new factories.